

Arvind Gupta in Conversation with Dr. Subodh Mahanti



Dr. Subodh Mahanti

Arvind Gupta, a Padma Shri awardee, is widely admired for transforming the process of education, especially in science, into an inexpensive joyful, hands-on experience for children. An engineer by training, he chose to devote himself to the cause of popularising science through simple, low-cost experiments made from everyday materials. His book 'Kabaad se jugaad' (toys from trash) has become a synonym to his name. He has reached millions of students, especially in under-resourced schools across India, through diverse modes of communication—workshops, books, and thousands of freely accessible videos. Gupta demonstrated that by making learning a fun one can say goodbye to the rote way of memorising. Gupta's approach empowers children to question, explore, and build things themselves – thus nurturing scientific temper and critical thinking. His approach makes science accessible, affordable, and engaging – inspiring generations of young learners to see science not as a subject to fear, but as an exciting way to understand the nature all around.

Subodh Mahanti : Gupta Ji, you earned your B.Tech. in Electrical Engineering in from the Indian Institute of Technology Kanpur in 1975 – a qualification that opened doors to a secure and rewarding career, both in India and abroad. Yet rather than following conventional path, you moved to science communication and education. Was this a sudden shift, or did it unfold gradually? What was the turning point that inspired the change?

Arvind Gupta : I joined TELCO as a Graduate Engineer Trainee in 1975. The 1970s were very revolutionary times. There was political churning all over the world. The defining political slogan was: Go to the people, Live with them, Love them, Start from what they know, Build on what they have. Many people remembered the Second World War and the Holocaust. They said they would not do war research – will not make missiles and bombs. They wanted to use their knowledge to help ordinary people. I was deeply influenced by individuals

who did positive work. One was Dr. Anil Sadgopal (Ph.D. Caltech and a senior researcher at the TIFR). He left TIFR to start the famous Hoshangabad Science Teaching Programme (HSTP) in 1970.

Subodh Mahanti : When you made the bold switch from corporate life to dedicating yourself to science education and innovating scientific toys, did you have a well-charted plan in place? If not, how did it evolve?

Arvind Gupta : I heard Dr. Sadgopal in IIT Kanpur as a second-year student. After completing my training in TELCO, I took one year leave and joined the HSTP. I thought that the science activities should be based on local materials. So, I visited the local weekly haat and bought one specimen of whatever was available – mirrors, bangles, small boxes, trinkets, etc. While getting my cycle inflated, I saw a black tube hanging – the cycle valve tube. I bought it. Within a month using

bits of valve tube and matchsticks, I did the Matchstick Mecanno. This made me very happy. For the first time I felt that I did something worthwhile in my life! This is how I got hooked to science teaching. It was much more fun than making trucks!

Subodh Mahanti : The phrase 'Making toys from Trash' has become synonymous with your name, and over the years you have produced over 1500 science experiments using discarded, low-cost, and readily available materials. Looking back, how do you reflect on this pioneering effort today?

Arvind Gupta : We thought that our science toys should be accessible to the poorest child on earth. We live in a consumerist society which every day produces mountains of junk. So, we made a 100 toys and experiments using old plastic bottles. Fifty playthings and models using old Frooti Tetra packs. Twenty caps using old newspapers! A break came in 2003 when the late Prof.



Jayant Narlikar (India's most decorated astrophysicist) invited me to work in IUCAA's children's science centre. We had a team of three – two amazing colleagues Dr. Vidula Mhaskar and Ashok Rupner and me. We set up our website arvindguptatoys.com in 2004. Today we have 8700 short, crisp 2-minutes videos on YouTube with a viewership of 12-crores. We have thousands of digital books. All my books can be downloaded freely.

Subodh Mahanti : Your work has profoundly influenced children to forge a genuine friendship with science, turning it from a daunting subject into an approachable companion. Could you elaborate on how you have seen this mindset shift play out in your interactions, and what strategies have been most effective in building that connection?

Arvind Gupta : Between 1987 and 2003 I had made over 125 films with the CIET, the TV wing of the NCERT. These science films were widely broadcast on Doordarshan under the programme Tarang. Each episode was of 15-20 minutes duration which tended to be repetitive and a tad boring. So, we made short, crisp two-minute 'Toys from Trash' captivating videos. Through friends and organisations, we dubbed



them into many Indian languages. Dr. Breezy Ocana Flaquer dubbed 300 of our videos into Spanish – a language spoken in 26 countries. One employee of L&T dubbed 200 videos into Bhojpuri!!

Subodh Mahanti: Your 'low-cost, no cost' approach has brilliantly shown that complex scientific concepts can be grasped through joyful play rather than rote memorisation. In promoting this concept in resource-scarce environment, what have been the biggest obstacles, and how you have overcome them to inspire underprivileged communities?

Arvind Gupta : Yes, there has been a paradigm shift in the last 40 years from chalk-and-talk lectures to science activities. The government has set up thousands of Atal Tinkering Labs. I think the biggest obstacles are teachers – who have never experienced the joy of discovery and making for themselves! They still stick to mug and spit and the rote methods. It will take a long time to change that mindset. The big entrance tests, JEE and NEET, give no weightage to practical learning. To crack them you just need to master the dumb MCQs but never need to dirty your hands! Once these national tests allocate some weightage to practical learning then everything will change. But this is unlikely to happen, otherwise the coaching industry will go bust.



One example: Most school labs have the Gold Leaf Electroscope for demonstrating Static Electricity. In the thousands of schools I visited, I have never seen a working model of the Electroscope. However, a dozen strands from a plastic sack tied together and rubbed together work amazingly. The poorest can afford it!

Subodh Mahanti : You have conducted hands-on workshop in over 3,000 schools in India and abroad. Can you describe one or two memorable interactions with students that reinforced your belief in child-led learning?

Arvind Gupta : At IUCAA for 11 years, every Tuesday and Thursday we conducted free workshops for children. Fifty children from a school came and spent three hours with us during which they made a dozen simple models with their own hands and took them away. This was the most life-giving experience for them. In all the 11 years no child ever ate her/his tiffin because eating would interfere with their creative work! I like mixed workshops with both teachers and children making things. Here teachers can see for themselves that children are far ahead of them! Children are far more creative and cleverer than adults! Hence the slogan: Catch them young; Imbue them with the love of science!

Subodh Mahanti : You have shown a profound love for books throughout your life, from collecting rare editions to sharing them with children and teachers across India. What sparked this passion, and how has it shaped your work?

Arvind Gupta : My parents never went to school. There were no books to read at home. But IIT Kanpur had a great library, which opened a new world for me. I am forever grateful for that. IIT Kanpur sparked the love of reading in me. I was an advisor to the National Book Trust in the 1990s. Forty years back, apart from Montessori, there were very few good books for teachers. We were able to get NBT to publish classics like Divaswapna and Tottochan. Today Tottochan is in the 31st edition in Marathi. I got deeply interested in children's books because of my daughter Dulari. Every day after returning from school she would devour a 200-page book. She read every single story by Chekhov and Tolstoy. So, I kept buying good books for her from Daryaganj – the second-hand book market in Delhi. One day we bought 300 Puffin books discarded by a school library! During that period, I got associated with Bharat Gyan Vigyan Samiti (BGVS). I translated a series of 100 little books for them into Hindi – anti-war, environment, disability, peace, great children's books. This Bal Vachan series sold an astounding 20 lakh copies. I also helped Vigyan Prasar with 20 amazing books including Soap Bubbles by C. V. Boys and The Story of Physics by Prof. T. Padmanabhan.

Subodh Mahanti : Your very first book, Matchstick Models and other Science Experiments, has been translated into 12 languages and sold over five lakh copies worldwide – a remarkable testament to its enduring appeal. Can you please

share more about your journey as an author, including how your writing evolved from those early experiments to your broader collection of books.

Arvind Gupta : Often we are dismissive about government departments. But the story of Matchstick Models and other Science Experiments is heartening. I gave a proposal to NCSTC to write and print 2000 copies of the book. But Prof. Yashpal overruled that. He opined that it was a very creative book and its first print order should be 25000!! copies. The success of the book boosted my morale. After that I never looked back. I wrote 24 books, and each got into 7-8 Indian languages. I translated about 20 books for the NBT and a few books for Vigyan Prasar.

Subodh Mahanti : You have made special efforts to catalyse affordable reprints of popular science classics, jointly with the help of both governmental and non-governmental organisations, to make them widely accessible. Why do you think these classics are so important? Could you name a few favourites?

Arvind Gupta : A country our size should have a vibrant culture of science books and magazines. Alas, this is not the case. Vigyan Prasar agreed to publish and translate many Science Classics which were in the public domain (copyright free). Three books by JBS Haldane – Science in Everyday Life; Everything has a history; My friend Mister Leakey. The Chemical History of a Candle; On the various Forces of Nature by Michael Faraday. Charles Darwin's Autobiography, and the fantastic Insect World of Jean-Henri Fabre. Two wonderful picture books Environment and Self-reliance, Energy and Self-

reliance by Yona Friedman. Some of these classics were later translated into several Indian languages. My favourite is Charles Darwin's Autobiography. As a young man he was deeply interested in collecting beetles. Once he saw a new species and grabbed it in one hand. Soon he found another new variety and caught it in his second hand. As he was about to go home he saw a third new species. What to do, his hands were full? He instinctively put one bug in his mouth and caught the new one with his free hand!!

Subodh Mahanti : Your translations of more than 290 books into Hindi and other languages have made global stories accessible to Indian children – what challenges did you face in adopting cultural nuances?

Arvind Gupta : Over the years after visiting thousands of schools and seeing badly run and locked libraries, the internet provided a new ray of hope. We thought of translating some of the best books in various languages in Hindi, Marathi, Gujarati, Tamil, Kannada, Telugu, Bengali and other Indian languages. All translations were done free by motivated people. We have translated thousands of books in Hindi and Marathi. Few hundreds in other languages. A few months back I was invited to address an online Senior Citizens Group. I urged them to leave behind a legacy for the next generation by translating good books for children. We coined a slogan SENIORS FOR JUNIORS. Their enthusiasm surprised me. Within two months we had 25 lovely Hindi translations of children's books! It was heartening to see that many Seniors quite adeptly used AI and ChatGPT for translation!

Subodh Mahanti : *Your contributions to the Internet Archive are phenomenal. What inspired you to invest so much effort in sharing such vast materials freely, and how do you envision this, evolving to further empower educators and children?*

Arvind Gupta : Copyrights!! We came into the world naked and alas we will go away naked too! The internet opened up the possibility of making every book, in every language, available to every child for free. This is my page on the Internet Archives https://archive.org/details/@arvind_gupta We scan old books in Indian languages and upload them. After the breakup of Soviet Russia, the printing of Soviet Books in various Indian languages completely stopped. We scanned over 4000 Soviet titles in various languages and uploaded them as MIR TITLES <https://archive.org/details/mir-titles?tab=collection> Digitising books by Tolstoy, Chekhov, Gorky and Pushkin in various Indian languages is retrieving a bit of our own heritage.

Subodh Mahanti : *You have uploaded thousands of videos to YouTube and a vast array of materials to the Internet Archive. How has this shift to online platforms amplified your reach compared to your traditional methods?*

Arvind Gupta : If we wish to reach out to many people, we have to leverage technology. Our YouTube videos have been viewed by 12 crore people. Everyday thousands of books are downloaded from my website. In today's world we need not only government initiatives but also motivated people to translate books in Hindi, Punjabi, Telugu, etc. Gone are the days of the snooty publisher! The digital world has created some

new problems about attention span etc. But it has certainly democratised knowledge. Anyone with a mobile phone can access it! I feel strongly that all science magazines like Vigyan (Hindi), Shristi Gyan (Marathi), Science Today and Science Age should be digitised and made accessible to future researchers. The most creative children's magazine in our country was TARGET whose founder editor was Rosalind Wilson. Most of today's children's authors in English were groomed by her. Alas, it is difficult to find a single digital issue of this most loved and inspiring magazine!! This is a national shame.

Subodh Mahanti : *You played a pivotal role in developing the Children's Science Centre at IUCAA, Pune. Could you share more about your responsibilities there, the scope of your work, and some memorable experiences that highlight its impact on children?*

Arvind Gupta : I spent 14 years in New Delhi. In 2002 my daughter finished her 12th and went to CMC / Vellore. Then we decided to shift base to Pune. On reaching Pune I was invited to work in the Children's Science Centre of IUCAA by Prof. Narlikar. We were a lean, thin group – a team of just three! Every day we made a new video and uploaded it. Every day we translated books. I translated the UNESCO Source Book for science for the Primary School for NBT, The VSO Science and Math Teachers Handbooks for Eklayva. Our centre was a fun and exciting place. We usually started our day with good music or an inspiring TED talk. Three Nobel laureates and 25 FRSS visited our centre. It was a place where creative people naturally gravitated. Sujata Godbole – a teacher of French translated 36 books by Isaac Asimov into Marathi. She was the wife

of Dr. Madhav Godbole – ex-cabinet secretary. In 11 years, we translated some of the most inspiring books for children and teachers – Danger School, Summerhill, Teacher, Bahuroope Gandhi, Sudbury Valley School, etc. We were good documenters – the best clerks of our times. In 2012, Google invited me for a lecture for their engineers. They told me that we were the second largest YouTube channel from India!!

Subodh Mahanti : *Looking ahead, what role do you see for tinkering with AI tools in fostering scientific curiosity among the next generation of Indian students?*

Arvind Gupta : AI tools can numb children. Wooden blocks, Lego and other such toys still remain the best for children's growth. A friend who teaches Astronomy in Delhi University Prof. Shobhit Mahajan recently wrote that many of his students seek recommendations. Now all their requests start with 'Dear Prof'. Earlier they would write 'Dear Sir'. Obviously, now even simple applications are AI generated! AI can dumb and take thinking away!! It is a double-edged sword. It can help us to speed up many things, like translations. But there is a distinct possibility that it might create a generation of nitwits!

Subodh Mahanti : *What are the key sources of inspiration that have shaped your remarkable journey in science education and innovating toys to make science friendly and accessible for children?*

Arvind Gupta : One deep inspiration in my life has been Gandhi. His quote LIVE SIMPLY, THAT OTHERS MAY SIMPLY LIVE inspired me. There have been many mentors – Prof.

CNR Rao (Bharat Ratna) taught us two courses, Prof. D. Balasubramanian (Kalinga Awardee), Dr. Anil Sadgopal (HSTP), Laurie Baker (I worked with him for 4 months), Prof. Yashpal, Prof. Narlikar – they all rubbed a little bit of their goodness on me.

Subodh Mahanti : *If you could share one key lesson from your journey – from IIT Kanpur to Padma Shri – what would it be for aspiring science communicators?*

Arvind Gupta : Find something you are passionate about. Plunge in that. I thought I was lucky to find something I loved doing. Your work should be intoxicating. It should completely consume you. Never chase success. Success will come anyway.

Subodh Mahanti : *As I mentioned, this interview will be published in a popular science magazine of the National Research Development Corporation, New Delhi. Your insights will surely enlighten its readers. Do you have any final thoughts or messages you would like to add?*

Arvind Gupta : I wrote a monthly column Little Science for three years for Science Age published by Surendra Jha, the father of Science Journalism in the country. He was the one who started Science Today in 1962. I wrote a column for Awishkar, NRDC's Hindi popular science magazine. I also wrote a column for Vigyan Pragati. I feel our science magazines should become more

interesting for children. Unfortunately, they are uniformly boring. Chachia Pai, started Tinkle with the idea of entertaining children with little nuggets of knowledge. That is the kind of child-friendly formulae which creative magazines must adopt.

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Arvind Gupta: A synonym of learning science through 'toys from trash'

Dr. Subodh Mahanti

In a world, where science often feels distant, abstract, intimidating and elite, Arvind Gupta presents the other way – joyful, accessible and friendly, transforming everyday trash into portals of wonder through innovative scientific toys. He has shown a feasible way to foster curiosity – the ultimate key to discovery and innovation – in resource-scarce schools and villages across India. Through his persistent, dedicated efforts, he has reached and inspired millions of children, igniting a lifelong passion for exploration.

Arvind Gupta ranks among India's premier science educators, embodying a remarkable range of talent as an innovative toy inventor from everyday trash, a prolific author and translator, a compelling orator, and a humanist philosopher dedicated to accessible learning. He has a very significant presence on social media.

Born in 1953 in Nagpur, Arvind Gupta earned his B.Tech. in Electrical Engineering from IIT Kanpur in 1975. He initially worked at Tata Motors (then TELCO) as Engineer Trainee but soon left after about two years for grassroots innovation driven by a passion to make science playful and inclusive through low-cost toys. He has visited thousands of schools to directly interact with children and teachers during his live demonstrations.

His initiative of educational/scientific toys from trash has received international acclaim. He has produced over 1,500 science demonstration experiments using discarded items like plastic bottles, newspaper, safety pins, trinkets and so on to demonstrate scientific principles like gravity, electro-magnetism, friction and many more. He has created more than 8,700 short videos featuring his demonstrations in 18 languages. These innovative and wonderful resource materials are freely available on his website (arvindguptatoys.com) and YouTube. These resources have reached millions of children in India and other countries, often living in remote areas.

Arvind Gupta produced over 125 episodes for India's government-owned public service broadcaster Doordarshan's educational show *Tarang* during his 25-year association with it. In these shows, Arvind Gupta demonstrated simple science experiments and toy-making using everyday household items. The programmes reached millions across India.

Arvind Gupta has written a number of books on science activities, toys and education. His first book was *Matchstick Models & other Science Experiments* (1987). His books are freely available on his website.

Arvind Gupta has made significant contributions as a translator. His primary aim in taking up translation is to make knowledge accessible to children and educators in the country. He has translated more than 290 books into Hindi. His focus in translation remains on children's literature, science education, and popular science classics. The books are drawn from Indian and global sources, English classics, international children's stories and educational materials. His simple and engaging language suits young readers from diverse linguistic background. His translation contributes toward democratising global literature, bridging cultural gaps, and fostering scientific temper.

Gupta has made significant contributions to the Internet Archive (archive.org). He works as both a prolific uploader and as a curator of educational resources. This activity perfectly aligns with his lifelong commitment to free, open-access knowledge for children, educators, and science enthusiasts.

Arvind Gupta worked in the Children's Science Centre (also called Muktangan Science Centre) at the Inter-University Centre for Astronomy and Astrophysics (IUCAA) in Pune from October 2003 until around 2014. He had joined the IUCAA's Centre at the invitation of its founder director Professor Jayant V. Narlikar. At IUCAA he focussed on science popularisation and outreach especially for underprivileged children. He conducted hands-on workshops, created educational toys and promoted his life-long passion of 'low-cost, no-cost' science activities. He collaborated on projects like activity books and science videos. He integrated astronomy concepts into playful learning to foster curiosity among young learners. He led free weekly tinkering sessions for children particularly for children coming from lower socio-economic groups of society.

Arvind Gupta was honoured with the Padma Shri, the fourth highest civilian award, by the Government of India in 2018 for his significant contributions to science education and making science learning fun through low-cost, recycled materials. He was given the award in the Literature and Education category. Besides Padma Shri, Arvind Gupta has received numerous important awards including:

- National Award for Science Popularization among Children of the National Council for Science and Technology Communication (NCSTC), DST, Government of India (1988). He was the first person to receive this award.
- National Association for the Blind Award, for designing appropriate teaching aids for pre-school visually impaired children (1991).
- The Distinguished Alumnus Award from IIT Kanpur in 2001.
- Prof. G.D. Parikh Memorial Award, by the M.N. Roy Humanist Centre for distinguished contributions in education (2004).
- The *Indira Gandhi Award for Science Popularization* conferred by the Indian National Science Academy (2008).
- One-India One-People Award by the One-India, One-People Foundation, Mumbai (2009).
- The C.N.R. Education Foundation Prize for Outstanding Science Teachers (2010).
- The TWAS (Third World Academy of Sciences) Regional Prize for Public Understanding and Popularization of Science (2010).
- Sri Chandrasekarendra Saraswati National Eminence Award by the South Indian Education Society, Mumbai (2010).
- The Dadhichi Award by The Education Society, Ambarnath, Maharashtra (2012).
- Distinguished Math Teacher's Award by the Association of Maths Teachers of India (AMTI) (2016).

- Dr. Narendra Dabholkar Memorial Award by the Maharashtra Foundation (2018).

Arvind Gupta has become an institution in his own right. Undoubtedly, his legacy will endure. He has touched millions of young minds. He has instilled a sense of curiosity in their minds by demonstrating how they can learn through their own thinking and imagination, using their own hands. He has taught them that science can be learned using the cheapest or discarded things available around them. He has demonstrated that learning science can be a fun exercise – not boring or difficult, as it is often assumed. Arvind Gupta has created a truly democratised learning system by crafting hands-on science toys from everyday waste materials, ensuring high-quality education reaches children from all economic backgrounds, particularly the most underprivileged. His tireless efforts –visiting thousands of schools and digitising books – continue to ignite curiosity in young minds through hands-on, unconventional science learning. Widespread admiration underscores hopes that Arvind Gupta remains active for many years to come – motivating future generations to embrace challenging, innovative paths in science education.

I would like to end this brief write-up on Arvind Gupta by the following quotation attributed to him: “Any fool can make a thing complicated, right?” he says, “It’s simplicity which is difficult to achieve.”

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